

NEEDLE-FREE JET INJECTION BIBLIOGRAPHY, DEVICE & MANUFACTURER ROSTER, and PATENT LIST

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Updates added since 11-May-2000 version:

{Anonymous1999}, {Anwer1999}, {Burgasov1974}, {Burkoth1999},
{Conry1999}, {Gigauri1973a}, {Gigauri1973b}, {Gigauri1973c},
{Gigauri1973d}, {Gigauri1974}, {Gigauri1975a}, {Gigauri1975b},
{Gigauri1976a}, {Gigauri1976b}, {Gigauri1976c}, {Gigauri1976d},
{Gigauri1977a}, {Gigauri1977b}, {Gigauri1977c}, {Gigauri1978a},
{Gigauri1978b}, {Gigauri1978c}, {Koroteev1980}, {Lundholm1999},
{Melemukha1973}, {Melemuka1974}, {Nikiforov1974}, {Milonov1976},
{Oberrye2000}, {Perel'man1976}, {Petrovskii1975}, {Ribakov1979},
{Robertson2000}, {Rybakov1977}, {Sawamura1999}, {Schlumberger1999},
{Shakhtmeister1974}, {Spiess1975}, {Williams2000}.

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Russian translations/summaries -- Dr. Vitali Pool
Bibliographic retrievals and collection, 1998 - 2000 -- Ms. Robyn Kaiser

LEGEND

R: citations requested

Double-indented items: not yet received or not on file

*** asterisks** before citation: article on intradermal vaccination but NOT via
needle-free injection device

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{Agafonov1969} Agafonov VI, Vorob'ev AA, Beliakov VD, Marenikova SS, Shtunderenko GV, Nekrasov IL, Il'chenko AA, Averbukh VV, Krasnikov AV, Lukin EP, Gnuchev NN, Vaniushin SP, Akatova-Shelukhina EM, Ishkil'din MI. Opyt provedeniia vaktsinatsii protiv ospy bezgol'nym metodom [Experience in performing vaccination against smallpox by the needleless method]. *Voenno-meditsinskii Zhurnal* [Military Medical Journal] (Russia) Jun 1969;6:48-50.

[*Agafonov1969* compared 488 soldiers receiving traditional scarification with 1000 receiving smallpox vaccine with the BIP-4 jet injector. Vaccine "takes" were 98% in BIP-4 group and 93% in scarification group, with no complications observed.

Conclusions: BIP-4 vaccinates 1,500 persons per hour, 23 times faster than scarification method. Vaccination teams should include 1 MD or physician assistant and 2 persons to help clean injection site.]

{Agafonov1970} Agafonov VI, Vorob'ev AA, Nekrasov IL, Lukin EP, Nikonov VA. Tekhnika provedeniia vaktsinatsii bezgol'nym in"ektorom BIP-4 [Technic of carrying out vaccinations with the needleless injector BIP- 4]. *Voenno-meditsinskii Zhurnal* [Military Medical Journal] (Russia) Jul 1970;7:51-52.

[*Agafonov1970* describe Pneumatic Jet Injector (B I P) BIP-4 device (includes photograph), weighing 1,500 g, using air or nitrogen power, consuming 10 liters per 1000 injections. Accepts 10-100 mL vials. Can be used for ID, SC, or IM injections. 10% of the time a blood droplet appears after injection.]

{Agafonov1972} Agafonov VI, Babkin EI, Vdovin DG, Vorobeichikov VM, Vorobiev AA, Gamieshko KP, Gapochko KG, Gefen NE, Evstigneev VI, Emelyanova OV, Zemskov EM, Imamaliev OG, Kamalov II, Kvirkadze VV, Kutyrev PA, Misnikov OP, Pushkarev VP, Rozhdestvensky DA. Sravnitel'naia kharakteristika proizvoditel'nosti razlichnykh metodov immunizatsii protiv chumy [Comparative characteristics of productiveness of various methods of plague immunization]. *Zh Mikrobiol Epidemiol Immunobiol* (Russia) Nov 1972;49(11):106-112.

[*Agafonov1972* compared oral, "aerogenic", and jet injection (BIP-4) routes of plague vaccine immunization, which each proved to be 10 to 15 times more productive in comparison with subcutaneous and "skin" methods.]

{Agafonov1973} Agafonov VI, Beliakov VD, Ishkil'din MI, Khokhlov DT, Rabinovich IaD. Immunologicheskaiia effektivnost' privivok protiv ospy i tularemii bezgol'nym metodom [Immunological effectiveness of immunization against smallpox and tularemia by the jet injection method]. *Voenno-meditsinskii Zhurnal* [Military Medical Journal] (Russia) Apr 1973;4:48-51

[*Agafonov1973* compared immunogenicity and safety of both needle-free and

conventional vaccination routes (needle injection or scarification, respectively) for tularemia and smallpox vaccines. They found comparable safety and immune responses, with titers somewhat higher for jet injection than the conventional route for both vaccines.]

{Agafonov1974} Agafonov VI, Babkin EI, Bulatova TI, Gamleshko GP, Gapochko KG. Bezygol'nyi metod immunizatsii assotsirovannymi sorbirovannymi vaktsinami [Jet method of immunizing with associated adsorbed vaccines]. Voenno-meditsinskii Zhurnal [Military Medical Journal] (Russia) Dec 1974;(12):44-48.

[Agafonov1974 compared needle and syringe with BI-2 and BI-3 jet injectors in guinea pigs and human cadavers. Guinea pigs showed less tissue damage than with old BIP-4 model. The BI-2 device delivered 1.0 mL doses of typhoid polyanatoxin vaccine (TAB_{te}), botulism toxoid, and/or tetanus toxoid to 1,581 soldiers, while the BI-3 was used for 1001 soldiers. Efficacy was comparable. Reactogenicity was "bearable".

{Agafonov1977} Agafonov VI, Vorobiev AA, Gapochko KG, Marennikova SS, Patrikeev GT, Babkin EI, Litvinova AP, Shenkman LS, Dorokhina TV, Podkuiko VN, Slobodin AZ, Shernoschekov KA, Borodai AP, Emelyanova OV. Sravnitel'naia otsenka sredstv i metodov immunizatsii liudei protiv natural'noi ospy [Comparative assessment of the means and methods of immunizing humans against smallpox]. Zh Mikrobiol Epidemiol Immunobiol (Russia) Jun 1977;(6):31-35. [oral, ID, jet injection]

{Agafonov1978} Agafonov VI, Bulatova TI, Gamleshko KhP, Gapochko KG, Gorodetskii RD. Effektivnost' kompleksnoi immunizatsii briushnotifoznoi vaktsinoi s poliana-toksinom v sochetanii s chumnym i ospennym antigenam [Effectiveness of comprehensive immunization with typhoid fever vaccine and polyanatoxin in combination with plague and small pox antigens]. Voenno-meditsinskii Zhurnal [Military Medical Journal] (Russia) Oct 1978;(10):51-4

[Agafonov1978 studied immunogenicity of simultaneous administration of typhoid polianatoxin vaccine via needle-free jet injection, plus oral smallpox, and oral plague vaccines. Immunogenicity was comparable to similar vaccines given by themselves. The frequency of systemic reactions to the typhoid vaccine by needle-free injection was 6.9%, while local reactions were 82% - 93%.]

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RELEVANT TO “NEEDLE-FREE”]

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Cleveland Clinic
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Traitement d'urgence des entorses simples

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Dr A. Krantz
Bulletin de la société medicale de Pau
Effets spectaculaires de la "Jet-Puncture" dans les douleurs fonctionnelles

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Injecter un liquide dans les rides du visage avec le Dermo-Jet

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Nuestra experiencia con el Dermo-Jet del Dr Krantz

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Technique originale du traitement sclérosant des hémorroïdes

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G.N. Wachs & T. A. Tromovitch
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Treatment of Alopecia Areata with the Dermo-Jet

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M. Wolinger
Compte rendu
Notre experience avec le Dermo-Jet du Dr Krantz

[NOT IN MEDLINE]

Xguyen Dinh Huong. Tiem Phong Lao Bang PhuOng Phap Dermo Jet.
TITLE??? YEAR??? VOL??? PAGES???

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Chippaux JP, Soula G, Campagne G, Rey M, et al. Optimiser la riposte aux épidémies de méningite à méningocoque: rapport d'un atelier d'experts réunis au CERMES (12 au 14 janvier 1998, Niamey, Niger). Atelier de Niamey [Optimizing the response to epidemics of meningococcal meningitis: report of a workshop of experts at CERMES (Niamey, Niger, 12th to 14th January 1998)]. Cahiers Santé May-Jun 1998;8(3):245-248.

MANUFACTURER ROSTER (by device names)
(past/current manufacturers Past/current locale)

Advantajet™, Freedom Jet™, GentleJet™, (also see PreciJet™, Preci-Jet 50®)

see Bareille1997

<http://www.advantajet.com/index.html>

Activa Brand Products, 6845 Davand Drive, Mississauga, Ontario Canada L5T 1L4

Tel: 902-566-3229, Fax Numbers - 902-629-1404 or 905-565-0065

[Formerly: Health-Mor Personal Care Corp. 185 East North Street, Bradley,
Illinois 60915, 815-932-5570, fax 815-932-4101, bought out 1998 by Canadian
company.]

Am-O-Jet™

American Jet Injector, Inc., 880 Orchard Lane, Lansdale, PA 19446-4520,

Tel: (215) 362-4815, Fax: (215) 362-4819, pager: 800-609-7231

Orifice: .005 inch = 0.127mm

Same out-of-patent design as Ped-O-Jet®

Avijet (see Syrijet Mark IV)

See Eidson1976

Mizzy, Inc., New York, NY

Berijet

Behring, Frankfurt Germany

see Zachoval1988

BI-1M™, BI-2, BI-3, BIP-4, BI-19

see Agafonov-*multiple years*, Evstigneev1994, Lukin1997,

Chemical Automatics Design Bureau (KB Khimavomatiki), Voronezh, Russia

Scientific & Research Institute of Surgical Instruments and Equipment (engineers L.F.
Banacov and S.P. Vanjushin)

<http://www.russianspace.com/voronezh.html>

<http://www.fas.org/spp/civil/russia/kbkha.htm>

Biojector™ 2000

See Monroe1992, Jackson1993, Davis1994, Gerbert1996, Williams1996, Gardner1997,

Greenberg1995, Zsigmond1995, Zsigmond1996, Gerbert1996, Florentine1997,

Anonymous1997, Bennett1998, Phero1998, Boyer??YEAR??, Stone??YEAR??,

Schultz??YEAR??,
<http://www.bioject.com/>
Bioject Inc., 7620 SW Bridgeport Road, Portland, OR 97224)

BIOJECTOR ORIFICES:	<u>inches</u>	<u>mm</u>	<u>Indication</u>
cartridge #2 (green 1502100) =	0.0039 inch	0.10 mm	SC
cartridge #3 (brown 1503100) =	0.0059 inch	0.15 mm	IM thigh - infants 15-20", 0-15 lbs.; IM deltoid - 21-47"/16-50 lbs
cartridge #4 (blue 1504100) =	0.0078 inch	0.20 mm	IM thigh/gluteus 21-47"/16-75 lbs. IM deltoid children >50 lbs, small adults (<80% median lean weight for height)
cartridge #5 (silver 1505100) =	0.0098 inch	0.25 mm	IM deltoid average adults (80-120% median lean weight for height)
cartridge #7 (red 1507100) =	0.0142 inch	0.36 mm	IM deltoid large adults (>120% median lean weight for height)

Biostar

Biostar, Inc., 343-111 Research Drive, Saskatoon, Saskatchewan S7N 3R2, Canada,
Tel: [1](306) 931-7500, Fax: [1](306) 242-9010,
email: jmanns@innovplace.saskatoon.sk.ca

DCI, Inc.

see LectraJet™

Derata Medi-Jector V

see Medi-Jector (below)
Depuy, Inc., 700 Orthopaedic Drive, Warsaw, IN 46581-0988,
Fax: 219-267-7196, Sales: 219-267-8143, 800-366-8143

Dermo-Jet™ [Dermojet], VACCI-JET (various models)

see Krantz1959, Juel-Jensen1965, Calvert1966, Lane1966, Cooper1966, Jeanneret1967,
Krantz1970, tenDam1970, Griffiths1971, Bakhur1972, Steinbrocker1973,
Bonner1973, Lachapelle1977, Lachapelle1982a, Lachapelle1982b, Kok1983,
Lachapelle1985, Dimache1986, Mihailescu1989, Dimache1991a, Dimache1991b,

Brodell1995, Furth1995, Dimache1997
Société AKRA, 23 bis rue Louis Barthou, Pau, FRANCE 64000, Tel: [+33] 59 274746,
Fax: [+33] 59 272270, <http://www.chez.com/dermojet/>,
dermojet@club-internet.fr
Previous U.S. distributor: Louis A. Awamy, 113 Sheraden Avenue, Staten Island, New
York 10314.
(Orifice = 0.2mm = 200um)

Dermojet S-591-H

no. 106078 B1 OSIM Romania
Manufactured by Aerotech S.A., Hydraulic and Pneumatic Equipments
Bucharest, Romania (see Dimache1997).
Ormont Drug and Chemical (see Shen1981)

Felton Medical, Inc.

11535 West 83rd Terrace, Lenexa, Kansas (KS) 66214
Tel: [+1] (913) 599-5959, Fax: [+1] (913) 599-0909, felton@wws.com

Genesis Medical Systems, Inc. (See Sensa-Jet)

Helios™ “gene gun”
(related **Accell®** and **Biolistic® PDS 1000/He** bombardment systems)
<http://www.bio-rad.com/972508.html>
see Williams1991, Pertmer1995, Haynes1996, Feltquate1997,
Bio-Rad, Inc. <<http://www.bio-rad.com/>>, Life Science Research Group, 2000 Alfred
Nobel Drive, Hercules, CA 94547, Tel: (510) 741-1000, toll free 1-(800) 424 6723,
Fax: (510) 741-5800, toll free fax: 1-(800) 879 2289, telex: 335-358.

Hypospray®

see Figge1948, Hingson1947, Ziff1956, Cockburn1965, Cunningham1965, Garbsch1966,
Baum1967, Spiess1968, Wright1968, Hughes1969a, Hughes1969b, Helm1969,
Neumann1973, Werner1974, Vadhera1975, Clarke1975
R.P Scherer Corp, Detroit, MI circa 1940s-1950s
“Metapule” orifice = 0.003 - 0.005 inch = 0.076 - 0.127 mm (75-80um = 0.003)

Iject™ (see Biojector 2000)

Imo-Jet™, I.M.-O-JET™ (see Mini-Imojet®)

Inject-100

Inject Medical Products, Inc., 22500 Muirlands Boulevard, Lake Forest, CA 92630

INJEX™

Equidyne Systems, Inc., 11696 Sorrento Valley Rd., Suite J, San Diego, CA 92121,
Phone 619-350-8096, Fax: 619-350-9726, equidyne@equidyne.com,
<http://www.equidyne.com/>

Inraject™

Weston Medical, Ltd. New Street, Stradbroke, Eye, Suffolk, England 1P21 5JG, UK, Tel:
[+44] (1379) 383-900, Fax: [+44] (1379) 384-800
<http://www.weston-medical.com>

Isajet™ (see **Mesoflash®**)

Ject-Aid [?? NOT YET CONFIRMED “NEEDLE-FREE”]

Past addresses: Autoject Systems, Inc., Oakwood Centre, 620 Wheat Lane,
 Oakdale, IL 60191 USA ???
Injectec, Inc., 11278 Los Alamitos Blvd, Suite 202, Los Alamitos,
CA 90720 USA ???

J-Tip®, J-Tip® Injector System

US Patent no. 4,913,699
National Medical Products (Tim Chapman), 57 Parker Street, Irvine, CA 92618
Tel: [+1] (949) 768-1147, Fax: [+1] (949) 768-1167, info@jtip.com
<http://www.jtip.com>
(Formerly: California Medical Innovations, Inc., 24121 Big Timber Street, Lake
Forest, CA 92630)
0.5 mL device: orifice size 0.008 inch (0.2 mm)
0.25 mL device: orifice size 0.006 inch (0.15 mm)

LectraJet™ (tentative, *inter alia*)

D'Antonio Consultants International (DCI), Inc.

6308 Fly Road, E. Syracuse, NY 13057
Tel:(315)463-4999 Fax: (315)463-5267 Email: rdc1@twcny.rr.com
US patents 5080648, 5318522, and US5569190

MadaJet™, MadaJet XL™

see Field1985, Lamm1985

MADA Medical Products, Inc.

http://www.madainternational.com/us/menu_us.html

US:

MADA Equipment Co., Inc.

60 Commerce Road - Carlstadt, NJ 07072, USA

Tel: 1-201-460-0454, Fax: 1-201-460-3509, Toll Free: 1-800-526-6370

110522.1404@compuserve.com

International:

MADA International, Ltd.

11430 N. Kendall Drive Suite 312 - Miami, FL 33176, USA

Tel: 1-305-274-2184, Fax: 1-305-274-2692, info@madainternational.com

Med-E-Jet™ (Pow'r-Ject™ - veterinary application)

see Neufeld1977, Cooke1980, Seddon1981, McKenzie1978, Cohn1972, Cohn1974, Canter1990, Vahsing1994.

Latest: "Med-E-Jet Inoculator", Evans Enterprise, 1293 Sunset Road, Mayfield Heights, Ohio 44124 USA, tel: (440) 473-1110, fax: (440) 473-1150, Evans@star21.com, <http://www.clevenet.com/med-e-jet/>

Earlier owner: Med-E-Jet Corporation, 12900 Trisket Road, Cleveland, Ohio 44115

Earlier owner: 8092 Olmway Avenue, Olmsted Falls, Ohio 44138, Tel: 1-800-231-4203.

(DSCP/DOD 28-May-98: "...Mr. Don Kuch now owns the parts and plans for their unit.")

orifice size: 0.15mm (Seddon1981)

MEDiVAX™

Program for Appropriate Technology in Health (Vitajet Corp.)

4 Nickerson Street, Seattle, Washington

orifice = 0.006 inch

http://www.path.org/html/medivax_.htm

Medi-Jector EZ®, Medi-Jector Choice®

See Neufeld1977, Martins1979, Houtzagers1988, Denne1992, Partsch1997, Verrips1998
Medi-Ject Corporation

[Formerly: Daystrol-Scientific, Inc. Minneapolis, MN 55435]
[Formerly: Derata Corporation (see Pehling)]
Former address: 161 Cheshire Lane, Suite 100, Minneapolis, MN 55441 USA (800)
328-3074 or (612) 475-7700. Fax: (612) 476-1009
Latest address: 161 Cheshire Lane, Suite 100, Minneapolis MN 55441 USA, tel 612-475-
7705, fax 612-476-1009
needlefree@mediject.com, <http://www.mediject.com/>

Mesoflash®, Isajet™

see Lachapelle1985, Haensler1999.
rue Gustave Gresse, 26400 Aouste sur Sye, France
Tél (04) 75 76 60 53, Fax (04) 75 76 60 54, pprolitec@compuserve.com
<http://www.europages.com/cgi-bin/u.pl?O=aa/prolitec>
(Mesoflash® models M10 and M40, Isajet™ models Isa10 [mice], Isa40 [humans])
Formerly: Béarn Mécanique Aviation S.A. (Boite Postale 41, Lons, F-64143 Billère,
Cedex France)

Mini-Imojet® (using Imule® cartridge), formerly I.M.-O-JET™, Imo-Jet™

see Whittle1987, Rey1989, Galy1992, Fisch1996, Parent du Châtelet1997
Pasteur-Mérieux Sérum et Vaccins (Pasteur Merieux Connaught, Rhône Poulenc): Dr.
Jean Lang: lang@bdr.pasteur-merieux.fr, 58 avenue Leclerc - B.P. 7046, 69348
LYON, Cedex 07 FRANCE, Tel: (33) 7273 7036, Fax: (33) 72 73 78 13
(Developer of earlier models -- I.M.-O-JET, Imo-Jet: Institut Mérieux, Lyon France; see
Whittle1987, Rey1989, Galy1992)

Pan-Jet, PanJet, Panjet-70, Panjet Mark 5

see Stanfield1972, Paul1978, Lambrianidis1979, Sowray1981, Berry1981,
Whittle1987
SHUCO International, Ltd., London, UK
Former U.S. distributor: Panray Division, Ormont Drug and Chemical Co., South Dean
Street, Englewood, New Jersey 07631.

Ped-O-Jet®

see Hendrickse1966a, Hendrickse1966b, Artus1966, Bettag1967, Dull1968, Millar1969a,
Millar1969b, Neff1969, Chambon1970, Gateff1970, Labusquiere1971,
Millar1971, Gotschlich1972a, Gotschlich1972b, Gateff1960s/1970s, Meyer1964,
Meyer1965, Gateff1968, Rey1973, Neufeld1977, Pluciennik1985, Fenner1988,
Furth1992, Jenkins1995, *inter alia*

U.S. patent no. 3,301,190

Manufacturer/distributed by Ped-O-Jet International - Keystone Industries, 616

Hollywood Avenue, Cherry Hill, NJ 08002, Tel: 609-663-4700, Fax: 609-663-0381, nkeystone@aol.com

Previous manufacturers:

- (1) Stirn Industries (US production, French ownership)
- (2) Vernitron Medical Products, Inc., Carlstadt, NJ;
- (3) Scientific Equipment Manufacturing Corporation (SEMCO), Lodi, New Jersey; and also Larchmont, New York (previous name "Hypodermic jet injection apparatus, automatic")

Subcutaneous nozzle orifice diameter: .005 inch = 0.127mm

Intradermal nozzle orifice diameter: ???

PenJet™ (US patents 5,730,723 & 5,851,198)

Visionary Medical Products Corporation; Penjet™
Box 6911, Beverly Hills, CA 90212, Tel: 310-201-0800, info@vmpc.com
<http://www.vmpc.com/>
<http://www.techmall.com/techdocs/TS980320-7.html>
<http://www.vmpc.com/prSafetySyringe.html>
<http://www.vmpc.com/prPasteur.html>

Porton Jet, Port-O-Jet

see White1969, Vibes1971.

Powderject™

See Dégano1998, Duckworth1998,
PowderJect Vaccines, Inc.
585 Science Drive, Madison WI 53711
Tel 608-231-3150, Fax 608-231-6990, <http://www.powderject.com/>
russ_smestad@powderject.com, lendon_payne@powderject.com
(Formerly: Geniva/Oxford Bio Sciences Ltd.)
(?Corporate links with BIO-RAD/Auragen DNA gold beads jet guns: **Helios™**,
Biolistic® PDS 1000, and **Accell®**)

Pow'r-Ject™ (see Med-E-Jet™)

Preci-Jet 50®

Identical to AdvantaJet® etc. (see above)
see Theintz1990, Bareille1997, Denne1992
Advanced Medical Technologies, Charlottetown, Prince Edward Island, C1E 1B0

Canada

Press-O-Jet

See Warren1955, Hingson1957 [diagram], Hingson1963
developed by Ziherl, Kish, and Warren (Z. & W. Manufacturing Co.)
orifice = 0.003 - 0.005 inch = 0.076 - 0.127 mm
1 mL steel reusable chamber

Robbins Instruments, Inc., 2 North Passaic Ave. - Box 441, Chatham, NJ 07928, Tel: (201)635-8972, Fax: (201)635-8732

Sensa-Jet™

Genesis Medical Technologies, Inc.
Robert E. Jones, President/Director, Suite 400B, 1600 Downing Street, Denver, CO
80218, Tel: 303-832-4909, Fax: 303-832-4919, cell 303-472-2997,
genmed@idt.net
Press release: <http://www.prnewswire.com/cgi-bin/stories.pl?ACCT=104&STORY=/www/story/12-22-1998/0000831767&EDATE=>

SICIM

SICIM s.p.a., Via Aquileia, 94, 34076 Romans d'Isonzo (GO) Italy,
Tel: 39 481 90188/ 39-481 90332, Fax: 39 481 90332)

SNAP JET®

Cambridge Biostability, Ltd.. Sumpter House, 8 Station Road, Histon, Cambridge CB4
4LQ United Kingdom
Fax: [+44] (1223) 352-960

Syrijet, Syrijet Mark IV (see Avijet)

See Bennett1971, Bennett1972, Greenfield1973, Mott1973, Mott1974, Frymire1974,
ElGeneidy1974, Hardison1977, Danowski1978, Denne1992, Grau1997,
Mizzy, Inc. - Keystone Industries, Cherry Hill, NJ, 616 Hollywood Avenue, Cherry Hill,
NJ 08002, Tel: 609-663-4700, Fax: 609-663-0381, nkeystone@aol.com
(Formerly, Mizzy, Inc., New York, New York, and Clifton Forge, Virginia, USA)

Tender Touch

Derata Corporation, Derata, MN
see Jovanovic-Peterson1993)
see Medi-Jector, above

Twinjector EZ (Japan Chemical Research, see Suzuki1995)

VACCI-JET (see Dermo-Jet)

See Krantz1970.

Velo-dermic jet

See Hingson1957 for mention

Vitajet®

<http://www.vitajet.com/>
Vitajet Corporation,
27071 Cabot Road, Suite 110, Laguna Hills, CA 92653,
714-582-0713, 800-848-2538)
1998-99: became subsidiary of Bioject, Inc.

Z&W Manufacturing Company

see **Press-O-Jet**
Warren1955, Hingson1957, Hingson1963
Z&W Manufacturing Company, 1951-1958,
multidose JI
electric powered spring compression, hand-pump syringe compression,

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GENERAL / MISCELLANEOUS RESOURCES - JET INJECTION

The Brother's Brother Foundation
(Founded by Robert Hingson, father of jet injection)
1501 Reedsdale Street, Suite 3005
Pittsburgh, PA 15233-2341
Phone: (412)321-3160, Fax: (412) 321-3325, BBFound@aol.com
<http://www.brothersbrother.com/>

CDC webpage on needle-free jet injection technology:
<http://www.cdc.gov/nip/dev/jetinject.htm>

Origins of jet injection experience in USA: Arnold Sutermeister, mechanical engineer noticed injections of diesel oil into workmen hands via pinholes in high-pressure oil lines. Teamed with surgeon John F. Roberts in prototype jet injector in 1933.

See Pollack1971.

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